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Opportunities for a Tablet PC or Smartphone-Based Gateway Devices in Telecommunication System

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Abstract. The widespread use of Tablet PCs and smartphones by the general public has spurred a move to adapt the technologies to the delivery of Telecommunication services. In this study, we compare user experiences between two gateway device user groups—dedicated terminal device users and mobile (Tablet PC, Smartphone) device users -- in the context of a diabetes disease management program. According to our results, not only was the mobile device group's rates for user satisfaction and service acceptance generally superior, they resulted in 80% cost savings when compared to the dedicated terminal group. However, it also was identified that smartphones were less convenient for older users due to unfamiliarity with technology and a heightened sensitivity to cost.

Keywords: Telecommunication, Nursing intervention, Diabetic disease

1 Introduction

Recent advancements in information technology have prompted the growth of a diverse range of technical applications for Telecommunication, a trend that has been buoyed by a rapidly increasing user base for Tablet PCs and smartphones [1-2]. However, only a few successful business models exist, and the clinical efficacy and cost effectiveness of Mobile-based solutions have not yet been systematically validated.[3-4] In this study, user acceptance and satisfaction rates and willingness to pay will be compared between dedicated terminal-based gateway device users and Mobile-based (Tablet PC/smartphone) gateway device users. Our results will

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hopefully demonstrate the effectiveness of Tablet PCs and smartphones in delivering telecommunication services.

2 Materials and Methods

A national project for disease management named "Smartcare" has been underway in South Korea over the last three years. 691 applicants in the program were asked to choose a gateway device. After screening the applicants for certain criteria (such as internet service availability and acknowledgement of several disclaimers concerning the privacy and information security), 401 final participants were selected. Participant data was collected and categorized according to demographic detail (age, gender, and region), device usage frequency, and history of nurse's call center inquiries. Additionally, a telephone survey was conducted to elicit more detailed responses concerning the following items: comprehension of service offering (2 questions), demand for products (1 item), satisfaction ratings (2 items), and user acceptance (3 items including willingness to pay). Statistics for each user group was analyzed based on the information gathered.

3 Results and Discussion

The distribution of gateway device preference by age groups is as shown below (Figure 1).

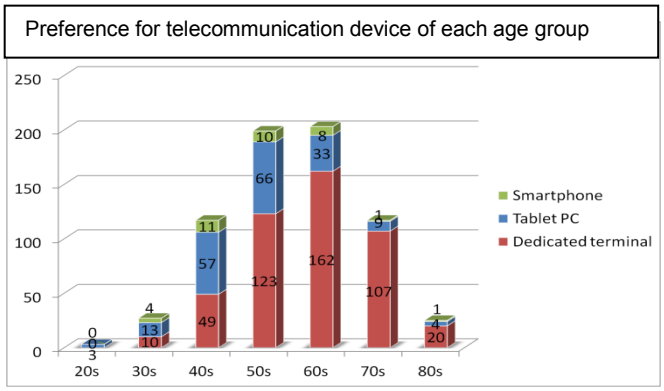

Fig.1. Preferred for gateway device of each age group shows different age characteristics.

According to our results, the average age of the participants exhibited a preference for a mobile device (Tablet PC or Smartphone) was 52.9 years (n= 220, stdev. = 11.16) and the average age of the participants that exhibited a preference for a dedicated terminal device was 62.3 years (n= 471, stdev = 10.5)

A Student's T-test (an independent two-sample t-test) was performed on the Tablet PC user group (n=139) and the dedicated terminal use group (n=229). The results of the F-test indicate that the two samples had unequal variances (Table 1).

Therefore, an unpaired unequal T-test was applied to analyze difference of a frequency of using devices (figures for smartphone usage were excluded from the analysis due to an insufficient number of users).

	General terminal	Dedicated terminal
Mean(# of usage/day)	0.44	0.32
Variance	0.12	0.20
F-test : P(F<=f) one tail	<0.001	
T-test : P(T<=t) one tail	<0.003	

Table 1. Frequency analysis (unpaired unequal T-test) of using general terminals Tablet PCs or Smartphones) and dedicated terminals in blood glucose measurement.

The T-test results indicate that there is a statistically meaningful difference in the frequency with which general terminal users take blood glucose measurements when compared to dedicated terminal users. The same analysis was applied to examine the frequency of blood pressure measurements. In this case, no meaningful difference in the frequency of blood pressure measurements was found between the two device categories. (P(F<=f) one tail<0.02 and P(T<=t) one tail >0.45).

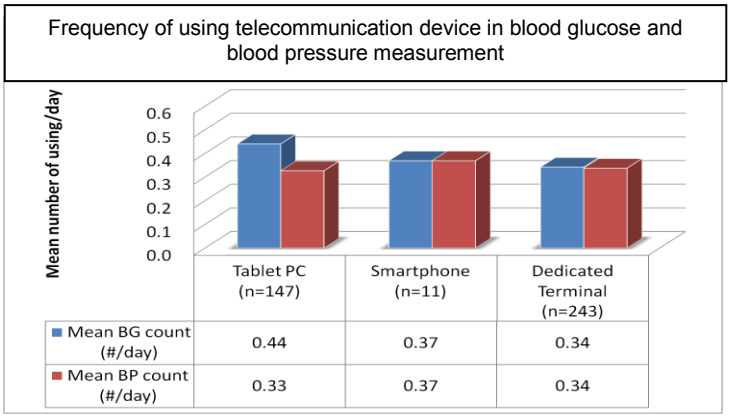

Fig.2. General terminal (specially Tablet PC) users conducted frequent measurements in blood glucose than dedicated terminal users but were equal in measuring blood pressure.

Results for the telephone survey are as follows: General terminal users reported relatively higher rates of satisfaction and an increased willingness to pay when compared to dedicated terminal users. This result is consistent with users who found value in the portability and multi-functionality of tablet PCs and smartphones. Dedicated terminal users reported more complaints about the difficulty of usage and frequent breakdown of devices, which lowered satisfaction rates and diminished the users' willingness to pay for service.

In the case of dedicated terminal devices, a patient had to purchase the device for the singular purpose of receiving telecommunication services. Tablet PC and smartphone users could pay only 10~20% of the cost of a dedicated terminal device to modify their existing mobile device. For manufacturers and service providers, a dedicated terminal requires dedicated manufacturing, logistics and A/S functionalities,

whereas tablet PCs and smartphones have the advantage of using an existing cross-functional platform to provide and maintain the devices.

In the question about general levels of service, more than 80% of both mobile and dedicated terminal users answered that their overall understanding of disease management by nursing call had improved. This can have particularly far-ranging implications in the case of patients with diabetes, where self-awareness is a key factor to successful disease management by nursing intervention.

In the question about willingness to pay, a total of 144 users answered that they would not to pay for this service. However, 32 users responded that they would change their mind if an insurance company would partially bear a portion of the cost burden (with an average desired subsidization of 79%). Interestingly, 34% of the respondents had been declared uninsurable due to an existing illness, indicating that there is an unmet need for insurance products that can cover long term illnesses such as diabetes.

4 Conclusions

Our results show that mobile-based gateway devices could be an effective alternative to existing dedicated terminal devices in delivering telecommunication services by nursing call. Moreover, user responses for mobile devices indicate a high rate of acceptance and willingness to pay, suggesting favorable prospects for future investment and growth in telecommunication-related businesses.

However, the use of smartphones in telemedicine presents some unique challenges with the older segment of the population, a group that has expressed resistance in adopting the technology and was less willing to pay the costs associated with mobile service. Though we were unable to recruit enough applicants to validate the smartphone in depth, the widespread use of smartphones among the general population leads us to believe that it certainly could be a viable option for telecommunication by nursing intervention in the near future.

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